I. Claims:

What is claimed is:

1. A cryogenic electrical power conditioning system, especially for vehicles, comprising:
   - a tank with a cryogenic fluid,
   - an electrical power generation system supplying power to
   - electronic motor drive circuitry cooled via said cryogenic fluid,
   - said drive circuitry controlling at least one electrical motor, cooled by said cryogenic fluid.

2. An cryogenic electrical power conditioning system according to claim 1 wherein
   - the electrical power generation sytem is an oxygen/hydrogen fuel cell, which also provides space heating.

3. A cryogenic electrical power conditioning system according to claim 1 wherein
   - the tank contains liquid hydrogen, delivered to the fuel cell via tubes,
   - said tank may be contained for safety reasons inside a second enclosure containing liquid nitrogen.

4. A cryogenic electrical power conditioning system according to claim 1 wherein
   - the tank contains liquid natural gas, delivered to the fuel cell via tubes and a reformer,
   - said tank may be contained for safety reasons inside a second enclosure containing liquid nitrogen.

5. An cryogenic electrical power conditioning system according to claim 1 wherein
   - the motors, at least one in number, but preferably two to four, use coils and windings made by high-temperature superconducting materials,
   - said motors are cryo-cooled via cold pipes connectedto the cryo-tanks.

6. A cryogenic electrical power conditioning system according to claim 1 wherein
   - electronic motor drive circuitry using semiconductor switches, capacitors, and preferably high-temperature superconducting inductor coils, all cryo-cooled via cold pipes for improved efficiency is connected to said fuel cell power supply and said superconducting motors preferably via superconducting cables,
   - said semiconductor switches to be selected from the set of cryo-MOSFETs, cryo-IGBTs, cryo-IGCTs, cryo-MTOs,

7. A cryogenic electrical power conditioning system according to claim 1 wherein
   - said power electronic circuitry is cooled by being placed into the temperature gradient environment between 20 K and 200 K for cryogenic cooling if LH_2 is used.

8. A cryogenic power conditioning system according to claim 1 wherein
   - said motor drive circuitry preferably using cryo-MOSFETs is housed in a hermetically sealed container immersed for cryo-cooling inside said cryo-cooled environment of a liquid natural gas tank.

9. A cryogenic power conditioning system according to claim 1 wherein
   - said motor drive circuitry is conduction cooled by cold fingers connected to said liquid hydrogen / liquid natural gas tanks.

10. A cryogenic power conditioning system according to claim 1 wherein
   - even in the case of said fuel cells being powered by uncooled fuels, the whole power electronics, i.e. motor drives and high-temperature superconducting motors, is cryogenically cooled in order to achieve high efficiency, ultra-small size, ultra-low weight and low cost.

11. A cryogenic power conditioning system according to claim 1 wherein
   - high-temperature superconductor cables are used for power transmission as well as for supply of cooling fluid such as liquid nitrogen making use of the "load shedding" property of said liquid nitrogen.

12. A cryogenic power conditioning system according to claim 1 wherein
   - in the case of liquid nitrogen use, the fuel cell efficiency is increased by also using liquid oxygen produced together with the liquid nitrogen, eliminating the need to pressurize the oxygen used in the fuel cell.

13. A cryogenic power conditioning system according to claim 1
   - which uses cryo-cooled semiconductor switches such as cryo-MOSFETs, cryo-IGBTs as active devices and cryo-diodes made of materials selected from the group of silicon and germanium for commutation in a circuit selected from the group of half-bridge, full-bridge, three-phase, and Stanley topologies, preferably using optical coupling to the gate control terminals,
   - where the cryo-MOSFETs, cryo-IGBTs and cryo-diodes are implemented in the form of Cryo-Multi-Chip Modules providing small size and low weight which is especially important for all transportation systems,
   - where the driver circuits are implemented by cryo-cooled integrated circuits,

- where the necessary filter inductors and power busses of the inverters are implemented with high-temperature superconductors.

14. A cryogenic power conditioning system according to claim 1
    - where the cryo-fuels are also used to cool a cryo-light system based on high-efficiency cryo-light-emitting gallium-arsenide-based diodes.